ENVIRONMENTAL MANAGEMENT PROGRAM

MISCELLANEOUS SOURCES OF WATER POLLUTION
BRIEF NO. 2

ASSESSMENT OF SOURCE SIGNIFICANCE

PREPARED FOR THE

ENVIRONMENTAL MANAGEMENT TASK FORCE

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INTRODUCTION

This document presents a summary of the significance of the miscellaneous water pollution sources identified in the earlier "Minor Sources of Water Pollution Brief No. 1." The assessment of the significance of each source is then used to select sources for study and plan development. The miscellaneous sources identified in Brief No. 1 include septic tanks (home waste disposal), vessel wastes, oil and chemical spills, dredging operations, mining, agricultural and feedlot runoff, construction erosion, and salt water intrusion into ground water.

Agricultural and feedlot runoff, and construction erosion are principally surface runoff related. As such, the analysis of the significance of the problems depends upon the surface runoff modeling, county progress reports, and the Bay Area Council of Resource Conservation Districts report. Information on these two categories of sources will be presented by the Surface Runoff program.

Analysis of the balance of miscellaneous sources was performed using a variety of approaches. Information was obtained from the county health departments, the San Francisco Bay Area Regional Water Quality Control Board (RWQCB), the U.S. Coast Guard, various port commissions, U.S. Geological Survey, water supply districts, the "San Francisco Bay Basin Water Quality Control Plan," the Bay Conservation and Development Commission, U.S. Army Corps of Engineers, and various technical papers. The following summary of problem significance is not intended to be complete and all-inclusive. During plan development, more information will be uncovered on problem areas for each type of source, particularly from the Advisory Committee. This information will be incorporated into the technical report supporting the recommended management plans.

For the purpose of the analysis that follows, significance is defined as those pollution problems that appear to be important enough to require some remedial action. Necessarily subjective, the assessment of significance is made with reference to the following factors:

- seriousness of the consequences of pollution
- frequency and areal distribution of problems
- likelihood of the problem becoming worse in the future.

CONCLUSIONS AND RECOMMENDATIONS FOR EMTF ACTION

Conclusions

The following table lists the miscellaneous sources of pollution together with their overall significance.

Source	Significance	Remarks
Oil and chemical spills	High	A major spill could have catastrophic consequences for Bay
Salt water intrusion	Moderate	Declining ground water quality may adversely affect water users. Difficulties in developing new surface sources may lead to increased reliance on ground water.
Septic tanks and other individual systems	Moderate	Use of individual systems will be confined to rural areas (approx. 5% of regional population and not likely to grow). Consequences of failure are usually not serious.
Dredging and disposal	Moderate	Produces localized water quality deterioration and negatively impacts aquatic organisms. Dredging occurs throughout the Bay area.
Vessel wastes	Moderate	Potential source of severe pollution in confined areas--docks, marinas, etc.
Mining activities	Low	Few documented problems. Mining is not widespread in Bay region and is unlikely to increase.

Recommendation

It is recommended that the EMTF adopt the following planning policy:

The Miscellaneous Pollution Sources Management Plan will address sources determined to be highly or moderately significant, that is, oil and chemical spills, salt water intrusion, septic tanks, vessel wastes and dredging activities. Water quality problems associated with mining activities are determined to be of low significance and will not be considered in this phase of planning.

SEPTIC TANKS

Nature of Problem

Septic tanks and cesspool systems are the most widely used form of individual sewage disposal, accounting for 5.8 percent of the households in the Bay region as opposed to 0.2 percent using other individual systems. Septic tank systems consist of two separate parts--a septic tank for anaerobic waste digestion, and a soil absorption system for ultimate liquid disposal. Water quality and health problems associated with septic tank systems are due to a number of factors: poor site location, improper design or construction, or poor maintenance. When these systems fail, wastewater travels through the soil too rapidly and reaches the ground surface, ground water, or surface water in too short a distance to remove pollutants. In some cases, wastewater can back up in the household plumbing system. Since soil absorption systems cannot effectively remove nitrates from water, poor location of septic tank systems can overload a ground water body used for drinking water supply with nitrates, which may pose a health risk to infants.

Problem Areas

Current water quality problems related to septic tank system failures are poorly documented because surveys are expensive to conduct and people are reluctant to let inspectors into their homes. Associated health problems are also difficult to document because they are usually related to the increased transmission of disease within a single household, cases of which are rarely reported. Based upon information from the RWQCB and various 201 wastewater facilities planning documents, problems related to septic tanks are thought to exist in the following areas:

- Conn Creek and the Lake Hennessey watershed in Napa County
- Stinson Beach on Bolinas Lagoon in Marin County
- Portola Valley in San Mateo County
- Emerald Lakes area in the watershed of Redwood City in San Mateo County
- Edgerly Island in Napa County
- North Petaluma Blvd. in Petaluma

These problems consist of bacterial pollution of surface waters, surface ponding of effluents, and blocked household plumbing systems.

Because of the poor documentation of water quality problems or of failure, it is not possible to prove conclusively whether the problems are due to isolated, relatively random failures in the area or to failures of all or a large percentage of the systems in an area.

Areas specifically converting to sewers and/or a centralized sewage treatment system as a result of septic tank problems include Pengrove and Glen Ellen in Sonoma County and Tomales in Marin County.

A survey of septic tank design criteria for the nine counties has shown many to be outdated, inconsistent and not in keeping with current technological information. Therefore, local design and installation requirements can be considered a problem area.

Significance

Although documentation of large scale septic tank system failures is spotty, several areas of failure have been identified and it is known that the documentation process is inadequate. When viewed with the fact that over 50 percent of the 208 planning area has soils classified with severe limitations for application to septic tank systems, the significance of septic tanks (and other on-site wastewater disposal systems) to the 208 process becomes apparent.

OIL AND CHEMICAL SPILLS

Nature of Problem

Oil and chemical spills include all accidental discharges to Bay waters or discharges on land which may ultimately drain to Bay waters. Most of these spills are termed "minor" (according to the quantity spilled) and they occur during routine activities such as chemical/oil transfer or tank cleaning. Such accidents are generally due to human error or equipment malfunctions. Occasionally, a large spill occurs as a result of vessel accidents or collisions.

Problem Areas

There are no inherent problem areas for spills in the Bay Area. An oil tanker docking facility that has no recorded accidents is not, strictly speaking, a problem area. However, all parts of the Bay that can be traversed by oil and chemical carrying vessels or are the location of refineries or chemical plants have the potential to become problem areas.

Selecting petroleum tanker vessels as a point of focus, during the period from January 1969 to June 1975, there are 67 tanker vessel accidents reported by the U.S. Coast Guard. The following table lists the type and number of mishaps.

Tanker vessel accident type	Number
Explosion and/or fire of cargo	1
Fire, vessel structure	1
Fire, vessel equipment	1
Grounding with damage	2
Grounding without damage	14
Flooding, swamping, without sinking	2
Material failure, vessel structure	3
Material failure, machinery	5
Material failure, equipment	3
Collisions	
with vessel in fog	2
with vessel anchored or moored	9
with navigation aid	3
with piers, fixed objects	16
with bridges	2
with vessel while docking/unloading	3
Total	67

Remarkably, only three of these accidents resulted in the release of oil: two single tanker accidents releasing less than 1,000 gallons of oil; and, the 1971 collision of two tankers under the Golden Gate Bridge, discharging approximately 840,000 gallons of oil.

Operational failures, as distinct from casualty events, are the principal causes of spills. The State Water Resources Control Board reported 246 spills from operational failures in the Bay Area between January 1970 and March 1971. Volume of spills was not always reported but 126 occurrences produced an estimated 39,600 gallons of spilled oil. The following table indicates the general causes of spills, where known.

Operation	Percent of spill events
Fuel transfer	55
Bunkering	19
Bilge pumping	14
Unloading cargo	10
Ballasting	2

Only 42 of 246 spills were assigned a probable cause. Origins of the spills were as follows:

Merchant ships	69
U.S. Navy ships	36
Industrial facilities	35
Unknown	106

Significance

Oil and chemical spills in the San Francisco Bay pose a significant threat to marine life. The short-term impact of large oil spills can have a devastating effect on marine life. Long-term impacts of large spills or of frequent minor spills are less well understood but are likely to be negative. Since vessel traffic in the Bay Area is expected to increase along with increased economic activity and reliance upon foreign and North Slope oil supplies, spill occurrences can be expected to increase, if they are not controlled by preventive measures.

DREDGING AND DISPOSAL

Nature of Problem

Natural and man induced soil erosion results in the river transport of millions of cubic yards of sediment (clay, silt, and sand) into San Francisco Bay annually. In order to maintain shipping channels in the Bay and the Sacramento River system, designated channels must be cleared of these sediments on a periodic basis.

Dredging causes turbidity and other water quality problems such as oxygen depletion of waters and release of toxic substances trapped or produced in the sediments. Disposal of dredged material poses serious problems due to a lack of land sites and negative impacts associated with Bay or ocean disposal.

Problem Areas

Navigation channels are dredged throughout the Bay system from San Jose to San Pablo Bay to Sacramento and Stockton. The definition of a problem area implies a negative effect of dredging at specific sites. The special consultant study being conducted on the effects of dredging activities, and incorporating the results of numerous previous studies on dredging problems, will establish specific problem areas in the Bay. The study report is not completed at this time.

Significance

The following points about dredging and spoil disposal must be made:

- Dredging does cause short-term water quality degradation
- Effects on marine life of degraded water quality are not fully understood
- Dredging and spoil disposal can cause destruction of marine life in the immediate vicinity of activities
- Dredging of shipping channels is widespread throughout the Bay-Delta system.

MINING

Nature of Problem

Mining activities in the Bay Area include extraction of construction materials, oil, gas, geothermal steam, salt from Bay water and, until recently, mercury and copper. Table 1 summarizes the major mineral extraction activities in the Bay Area. Water quality problems resulting from the extraction of minerals can be separated into two categories: first, erosion from disruption of land surface; and second, the release of minerals in mine wastes to receiving waters.

Problem Areas

Construction material mining operations have been subject to specific Waste Discharge Requirements established by the RWQCB. Mine operators must file self-monitoring reports with the RWQCB. These reports, although not totally comprehensive in nature, do not indicate any significant water pollution problems. Other documentation on construction material mining problems was not uncovered.

Extraction of oil, gas, and steam require the drilling and use of deep wells. Drilling practices are regulated by the California Division of Oil and Gas. Drilling involves a fair amount of disruption of the land surface for access roads, retention ponds and storage structures. After drilling has been completed, most of the land can be returned to its original condition. No documentation on energy resource extraction problems was uncovered.

Removal of salines from Bay waters occurs in the south Bay in ponds covering approximately 35,000 acres of former marshland. Possible water pollution problems associated with salt harvesting come from disposal of the highly concentrated bittern liquid (residual solids) remaining after harvesting. Bittern is a highly toxic solution due to the concentration of naturally occurring minerals from Bay waters. Currently bittern is being stored by the salt company. In the future, this bittern either will be diluted and discharged through the proposed treated sewage effluent outfall of the South Bay Dischargers Authority, or diffused and discharged near the existing ponds through a separate outfall. These alternatives are acceptable to the RWQCB.

Mercury contamination of fish and sediments has been found in Almaden, Calero and Guadalupe Reservoirs in Santa Clara County. The source is believed to be tailings and rock dumps from mining activities that have

TABLE 1: MAJOR MINERAL EXTRACTION ACTIVITIES IN THE BAY AREA

Mineral Resource	Type of Operation	Location (By County)	Approximate Value Annually
Construction Materials			$70 million per year
Sand & Gravel	Surface mine Submarine mine	Alameda, Napa, San Francisco, Santa Clara, Solano, Sonoma	
Crushed Stone	Quarry	Alameda, Contra Costa, Marin, Napa, San Mateo, Santa Clara, Solano, Sonoma	
Limestone	Quarry Submarine mine	Alameda, San Mateo, Santa Clara	
Energy Resources			$30 million per year
Coal	Surface mine	Contra Costa (stopped)	
Geothermal	Well	Sonoma	
Oil and Gas	Well	Contra Costa, Solano	
Salines	Pond	Alameda, Napa, San Mateo, Santa Clara, Solano	$16 million per year
Mercury	Underground mine Quarry	Santa Clara (has not been mined since 1973)	Fluctuates ($110 million total to date)

occurred in this area since 1850. Because the sources of the mercury are too scattered to contain, and the mercury has not been found in the water itself, and the last active mine was closed in 1973, the staff of the Santa Clara Valley Water District do not feel that corrective or remedial measures should be taken.

Copper was once mined near Benicia. Copper levels in nearby waters were found to be more than 100 times background levels. It was thought that rainfall and runoff through the old slag heaps caused the problem. Since the RWQCB ordered the heaps sealed in 1972 against leaching, no further problems have been recorded.

Significance

The principal mining activities of significance in the Bay Area are construction material extraction and salt evaporation. It appears that salt evaporation wastes will be handled adequately. In addition to the RWQCB controls on mining mentioned earlier, a new State Law, the Surface Mining and Reclamation Act of 1975, requires reclamation plans for new mining activities with some water quality protection elements. Thus, mining activities may be adequately controlled in the future. Substantial current problems have not been documented. New measures as part of the Environmental Management Plan do not appear to be necessary at this time.

SALT WATER INTRUSION

Nature of the Problem

Water supply demand for ground water in excess of natural fresh water recharge results in a lowering of the ground water table. When the water table in coastal areas is lowered to the point where the hydraulic gradient is sloping toward the land, salt water or brackish water can become a source of the recharge water in an area creating salt water intrusion. The increase in salt is measured by the concentration of chloride in the water. Contamination is commonly defined as occurring when the concentration of chloride exceeds 100 mg/l.

Problem Areas

There is a heavy reliance on ground water sources, particularly in the southern Bay Area. As of 1934, water levels in deep aquifers of the Santa Clara Valley had dropped 100 feet. The overdraft resulted in subsidence of the ground, and inland incursion of tidal waters. An aggressive ground water recharge program by the Santa Clara Valley Water District had reduced the overdraft to 70 feet by 1973. Salt contamination of shallow aquifers has also receded.

Elsewhere, there is local contamination of deep aquifers in the Centerville area of Fremont and ground water supplies in Palo Alto have been reported threatened with salt contamination. The Santa Clara Valley Water District has undertaken design of a reclaimed water injection system to repel the salt intrusion.

In the North Bay, localized areas of salt water encroachment are present near Petaluma Creek and Sonoma and Napa Valleys. Previous overpumping at Pittsburg had caused infiltration of brackish Delta water into the ground water. The Contra Costa Canal project, providing surface supplies as a substitute for ground waters, and the regulation of the Sacramento River flow have remedied this problem. The Fairfield area had also suffered from overdraft until Lake Berryessa water became available via the South Putah Canal.

Significance

The only area with significant salt intrusion problems at the present time is the southern Bay Area. However, alleviation of salt intrusion problems has been through the substitution of ground water supplies by surface waters. This may be a temporary solution dependent upon the availability of limited surface water supplies to a growing and thirsty population.

Since surface water supplies are limited and development of new surface sources is controversial due to high cost and environmental impact, it is likely that reliance upon ground waters will increase. A drought situation, as currently being experienced, increases ground water use with possible disregard for balance with recharge quantities. Salt water intrusion could be the result of these activities. Fragmentation of responsibilities for water supply in the Bay Area makes regional ground water resource planning a difficult task.

Because salt water intrusion problems have occurred in the Bay Area and because there is significant potential for future problems, the protection of ground water supplies can be considered an appropriate concern for the 208 planning effort.

VESSEL WASTES

Nature of Problem

Vessel wastes encompass sanitary and bilge wastes from private, commercial and military vessels. Historically, vessel wastes were discharged directly to the water and ships did not have room, or need, for waste storage or treatment facilities. The current wave of environmental awareness has, to some extent, changed the situation. While at sea, vessels still dump their wastes overboard, but the dilution is extremely high and the effects, unnoticeable. In port, vessels are increasingly being required to manage their wastes.

Naval vessels, in port too long to utilize the open ocean as a disposal site for raw wastes, are being remodeled with on-board treatment facilities for sewage. The Navy expects to have all ships converted by 1981. Until that time, some ships may dump raw sewage into the Bay. Only Alameda Naval Air Station has raw sewage pump-out facilities but not all ships are equipped to connect to those facilities.

Bilge wastes, which consist of seepage and most water draining through the ship, are either dumped at sea or pumped to dockside detention vessels, which separate oily wastes from "clean" water by gravity settling. The oily wastes are then hauled to landfill sites and cleaned water discharged.

Large commercial and passenger vessels usually have holding tanks for sewage wastes and empty these and their bilge wastes into the ocean, or pump them into shoreside facilities.

Houseboats, which are concentrated in Richardson Bay, are for the most part, connected to a sewage system. One remaining marina for houseboats which does not have a sewage system is in the process of installing a system.

Sewage discharges from private pleasure craft are commonly dumped directly in the Bay by flow-through toilets. These private vessels also discharge their bilge wastes overboard. The Environmental Protection Agency (EPA) requires marine sanitation devices on board for the holding or treatment of wastes. The vessel owner can select treatment or a holding tank. The United States Coast Guard (USCG) is responsible for enforcing the EPA regulations. Enforcement is poor because USCG staffing problems, difficulties of boarding a vessel for "toilet" inspection without cause, and weak penalties for non-compliance.

Sewage pump-out facilities at marinas are a necessary element of a successful marine sanitation device program. Unfortunately, a recent survey, conducted by AGAG staff, indicates that only 11 out of approximately 145 marinas in the Bay Area are equipped with facilities to pump out a vessel's holding tank.

Problem Areas

Vessel wastes in the Bay Area can be discharged directly in the open Bay or within the relatively enclosed confines of the marinas. In order to put the open Bay discharge into perspective, the following gross hypothetical comparisons could be made:

- There are approximately 16,400 pleasure craft in the area. If every single vessel was out on the Bay on one day, and if every craft contained two people, then the maximum raw wastes from these crafts would be equivalent to the untreated sewage discharge from a residential community of 33,000 persons or the treated sewage discharge from a residential community of 220,000 persons.

- This compares to an estimated 1980 treated municipal sewage discharge from 4.7 million persons in the Bay Area.

- The maximum pleasure craft waste discharge would be very roughly equivalent to five percent of the 1980 municipal discharge.

It may thus be seen that, in the most extreme case, the open Bay private vessel discharge, while violating EPA regulations, would be insignificant in comparison to municipal loadings.

In enclosed bays and marinas, where vessel concentrations can be high, the RWQCB has identified the following areas with high coliform content that may be due to vessel discharges:

- Richardson Bay

- Carquinez Straits

- Albany Hill, Point Isabel, Brooks Island area

- Area west of Paradise Bay and Point San Pedro

- Redwood Creek area

This list is not all-inclusive. The identification of all marinas with water quality problems would require an extensive sampling program that has not previously occurred.

Significance

Private pleasure craft produce the most vessel waste discharge problems. These problems would have their most significant impact in enclosed bays and marinas, which are located in every county of the Study Area. Based upon available bacteriological data, pleasure craft problems should be addressed in the 208 plan. Based upon violations of EPA regulations, pleasure craft problems must be addressed.